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Interaction between a submesoscale front and convective turbulence VICKY VERMA, HIEU T. PHAM, SUTANU SARKAR, University of California, San Diego — The coherent vortex filaments and eddies of the submesoscale (10 km - 0.1 km) play a crucial role in transporting heat, salt, dissolved gases, and organic matter across the mixed layer and in restratifying the upper ocean. In contrast, the finescale (smaller than O(100) m) is primarily responsible for mixing and dissipation. In the model problem, a warm filament with active submesoscales evolves in the presence of convective turbulence. The surface cooling flux, which drives the convective turbulence, is varied among cases. The flow, simulated using LES, is separated into the two scales with an explicit low-pass filter. We find that when the surface cooling flux increases, so do the downwelling velocity and the vertical buoyancy flux associated with the coherent submesoscale. The finescale dissipation also intensifies in the vortex filaments. Moreover, the finescale velocity that develops at the fronts is different from convective turbulence, e.g., in the level of anisotropy.

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